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Wage Flexibility and Contract Structure in Germany

Lars Vilhuber

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Wage Flexibility and Contract Structure in Germany*

Lars Vilhuber†

Résumé / Abstract

Dans cet article, nous analysons la corrélation des revenus de travail contemporains avec les conditions sur le marché du travail à différents moments pendant la durée du contrat. Les données que nous utilisons proviennent du Panel Socio-Économique allemand, et comprennent la période 1984-1994. Contrairement aux résultats pour le marché américain, nous trouvons que l'état actuel du marché du travail est important même en vérifiant d'après des valeurs passées du taux de chômage. Ces résultats sont cohérents avec la présence de syndicats négociant salaire et emploi simultanément. Toutefois, des modèles de contrats individuels, tels les modèles de contrats implicites, expliquent une partie de la variance de revenus de travail et des mouvements de revenu à long terme. De plus, nous étudions l'hétérogénéité des contrats selon certaines caractéristiques des travailleurs et des emplois. En particulier, nous constatons que les contrats de travail diffèrent selon le secteur d'activité et la taille de l'entreprise. Un travailleur dans une grande entreprise est remarquablement plus isolé des fluctuations du marché du travail qu'un autre œuvrant dans une entreprise de taille moindre, ce qui suggère l'importance des marchés de travail internes pour ces firmes.

In this paper, we look at how labor market conditions at different points during the tenure of individuals with firms are correlated with current earnings. Using data from the German Socioeconomic Panel on individuals for the period 1984 to 1994, we find that both the contemporaneous unemployment rate and prior values of the unemployment rate are significantly correlated with current earnings, contrary to results for the American labor market. We interpret this result as evidence that German unions do in fact bargain over both wages and employment, but that the models of individualistic contracts, such as the implicit contract model, may explain some of the observed wage drift and longer-term wage movements reasonably well. Furthermore, we explore the heterogeneity of contracts over a variety of worker and job characteristics. In particular, we find evidence that contracts differ across industries and across firm size. Workers of large firms are remarkably more insulated from the job market than workers for any other type of firm, indicating the importance of internal job markets.

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* Correspondence Address: Lars Vilhuber, CIRANO, 2020 University Street, 25th floor, Montréal, Qc, Canada H3A 2A5 Tel: (514) 985-4000 Fax: (514) 985-4039 e-mail: vilhubel@cirano.umontreal.ca
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† Université de Montréal, CRDE and CIRANO

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1 Introduction

Earnings constitute a large fraction of household income, and factors affecting earnings thus have a major impact on the distribution of income. The secular rise in unemployment in recent years in Europe and Canada has renewed interest in the interaction between labor market conditions and earnings. In the present paper, we report results from an analysis of German panel data in the view of a set of wage models. The results shed new light on some aspects of the dynamics of German earnings with respect to labor market conditions, and underlines the fact that labor markets in Europe are different from North American markets.

Specifically, we look at how measures of labor market conditions at different points during the tenure of individuals with firms affect their current earnings. These measures are chosen to approximate different types of contractual models. Following Beaudry & DiNardo (1991), one can show that the wage of workers who are not mobile across employers will depend on their alternative (employment) utility at the start of the current job if employers can commit to long-term contracts, On the other hand, if they are mobile, current wages will depend on their best alternative utility since the start of their contract. General equilibrium considerations are invoked to describe alternative utility as a function of unemployment. These models are contrasted with a reduced form model in which the current wage will depend exclusively on current labor market conditions. This may be consistent with a number of models, including a standard labor demand model as well as a union bargaining model. Given the German institutional background, we argue that the most likely interpretation is the latter, though this is open to argument.

Using data from the German Socioeconomic Panel on individuals for the period 1985 to 1994, we find that both the contemporaneous unemployment rate and prior values of the unemployment rate are significantly correlated with current earnings. We interpret this result as evidence that German unions do in fact bargain over wages and employment, but that models of individualistic contracts, such as the implicit contract model, may explain some of the observed wage drift and longer-term wage movements reasonably well. The elasticity of earnings with respect to contemporaneous unemployment is approximately 12 percent, on par with previous studies of the German labor market. The effect of past measures is about half as strong.

Furthermore, we explore the heterogeneity of contracts over a variety of worker and job characteristics. In particular, we find evidence that contracts differ across industries and across firm size. Workers of large firms are remarkably more insulated from the job market than workers

for any other type of firm, indicating the importance of internal job markets.

The results obtained in this paper provide empirical evidence in line with previous articles on implicit contracts in the United States (Beaudry & DiNardo 1991). It augments and qualifies results reported in the literature on the wage curve (Blanchflower & Oswald 1994, Wagner 1994), where current earnings are correlated with current unemployment. Beaudry & DiNardo (1991) showed that this empirical result is not robust to the inclusion of unemployment rates appropriately chosen during the current employment spell. Our results bridge this gap, implying that the latter result may be an artifact specific to the U.S. economy, and only partially true for Germany.

The paper is organized as follows. Section 2 gives a brief overview of the models that we use to obtain predictions as to the correlation between the history of labor market conditions and current earnings. As we briefly mentioned above, institutions are relevant to interpreting the results, and we briefly describe some institutional background in Section 3. In Section 4, we describe the data used. Section 5 describes the results obtained and some of the econometric issues relating to these. In Section 6, we test the robustness of the results from the previous section across different dimensions of worker and job characteristics. Section 8 concludes and offers an outlook to further analysis.

2 Theoretical background

The relationship between wages and unemployment has often been discussed in the literature. A number of models have implications linking contemporaneous unemployment to wages, ranging from compensating differentials to incentive contracts. Others, predominantly based on contracts, link past measures of labor market tightness to current earnings. We will expose here the salient characteristics of the most important ones.

Implicit contracts

The basic idea in the literature on implicit contracts is that risk-averse workers can only insure themselves with their risk-neutral employers against shocks to labor productivity. Suppose further that productivity follows an AR(1) with parameter α. The resulting contract will depend on the mobility assumptions for both workers and firms. Assume that firms can commit to contracts, and that they compete for work-

ers, for whom mobility is costly. Then it can be shown (Beaudry & DiNardo 1991) that wages are rigid during tenure, and will depend on the alternative wage $\underline{w}$ and expected productivity ϕ^*:

$$\log w_{t,t(0)} = \delta_1(\alpha, \beta, \mu) \log \underline{w}_t + \delta_2(\alpha, \beta, \mu) \log \phi^* + k \tag{1}$$

where δ_j are reduced form functions of the structural parameters α, discount rate β and the worker's survival probability μ, and $t(0)$ the point in time at which current tenure started. A general equilibrium argument relating the change in the worker's reservation wage to the participation wage establishes the link with unemployment, leading to a estimable form of (1):

$$\log w_t = X_t'\beta + \gamma u_t \tag{2}$$

with

$$u_t = U_{t(0)}, \tag{3}$$

where we denote by u_t the relevant measure of unemployment determining wages at time t, by U_t the level of the unemployment rate at time t. The vector X_{it} includes the usual human capital controls thought to affect a worker's productivity (in logs). Since workers are not mobile, their wages will be a function only of unemployment at the start of the job, as denoted by (3).

Costless mobility

If workers are mobile but firms can still commit to the employment contract, then the contract will be upward flexible, being renegotiated every time the worker's alternative utility becomes binding (Harris & Holmstrom 1982). Linking as before alternative utility to unemployment implies that the lowest level of unemployment since the start of the current contract will be the principal determinant of the current wage. Thus,

$$u_t = \min_{p \in [t(0), t]} U_p \tag{4}$$

replaces (3). Once renegotiated, the initial level of unemployment does not influence current wages anymore, and wages will be function only of unemployment rates at the time of renegotiation.

Efficiency wage

Efficiency wage models of the shirking type[1] suggest that incentives to furnish effort derive from the threat of losing a surplus extant in a relationship. This surplus may be generated by direct mobility costs, the presence of specific human capital or a number of other reasons. The link most commonly studied is the one proposed (not exclusively) by Shapiro & Stiglitz (1984). There, unemployment implies a loss in utility since the probability of immediate re-employment is less than unity. Thus, there is a benefit to the employee of staying with the current employer. The model thus directly links unemployment to effort levels and wages. Wages are the carrots and unemployment the stick to achieve an equilibrium in which no shirking occurs.

Effort e can be either high or low, and can be detected with probability q. If caught shirking, the employee is fired, in which case he receives unemployment benefits w_0 while unemployed. In every period that he is unemployed, he will be re-employed with probability a. The incentive compatible wage derived from the model is then

$$w = e + w_0 + e(a + b + r)/q \tag{5}$$

where r is the discount rate. In equilibrium, the flows out of unemployment $a(N - L)$ must be equal to flows out of employment bL, so that $a + b = b/u$. Substituting in (5) obtains

$$w = e + w_0 + \frac{e}{q}\left(\frac{b}{u} + r\right) \tag{6}$$

which shows a negative relationship between wages and unemployment. Note however that due to the forward-looking character of the incentive constraint, the appropriate measure u is the expected value of future unemployment. If unemployment follows a unit root process, the current unemployment rate is sufficient to form expectations of future unemployment rates. Thus, past values should not influence current wages once contemporaneous unemployment has been controlled for, and the efficiency wage model implies

$$u_t = U_t. \tag{7}$$

Renegotiation-proof contracts

One critique of both of the above models is the lack of incentive compatibility for the employer. The employer is assumed to be able to commit

[1] The most cited paper is Shapiro & Stiglitz (1984). See Carmichael (1990) and Lang & Kahn (1990) for a critical look at efficiency wage models.

to long-term contracts. If the employer's outside option in a contractual relationship becomes binding, it is however optimal to renegotiate. MacLeod & Malcomson (1989) (see also MacLeod & Malcomson 1993) have pointed out that if one increases the contract space by allowing for discretionary bonuses, then any allocation of the surplus from a relation may be consistent with an equilibrium. The efficient contract will fix a wage at the beginning of a relationship according to a split of the surplus. Since this split is the result of some bargaining process between the two parties and thus Pareto-efficient, no party will want to renegotiate afterwards, except if one party's outside option is larger than the utility obtained from continuing the present contract. If this constraint becomes binding, both parties will renegotiate, and the new contract will reflect the split of the surplus at the time of renegotiation. If the worker's outside options are a decreasing function of unemployment, then the wage in the current contract will reflect the best labor market conditions since the start of the contract as in the implicit contract model, but conditional on the employer's outside option not having been binding in the meantime, and conditional on the value of the best labor market conditions, occurring say at time $t > t(0)$, having been higher not only than the value of the outside option at time $t(0)$, but also higher than the value of the contract at time t. Hence, the same conditions derived from the costless mobility version of the implicit contract model are consistent with the contract model here, but are neither a necessary nor a sufficient condition for this model. Thus, though we may find that our results are consistent with this model, we cannot test it, as our regressions cannot falsify its implications.

Union bargaining models

In models of collective bargaining, a union with a well-defined concave utility function is assumed to bargain over wages and possibly employment with a profit-maximizing firm. If the bargaining agenda only covers wages, the resulting contract locus will coincide with the labor demand curve, implying a negative relationship between wages and employment, and thus a positive correlation between unemployment and wages.

If the bargaining agenda covers both elements and bargaining powers on each issue are equal[2], the slope of the contract locus will depend on the union's risk aversion. If the union is risk-averse, the contract locus will have a positive slope in wage-employment space, thus implying a negative correlation between unemployment and wages. Heterogeneity

[2]See Manning (1987) for an analysis of when bargaining powers are not equal on each issue.

in relative bargaining powers allows identification of this curve. The relative bargaining powers of union and firm are reflected in the position along this curve. If unions and/or firms differ in their relative bargaining powers, a cross-section of contracts will identify the slope of the contract curve.

Estimation

The models described above unfortunately have non-exclusive implications as to the simple relationship linking employment and/or unemployment with wages. Thus, we cannot in this context test for one or the other of these models, though we may obtain results which are consistent with one, but not the other model.

The model estimated is

$$\log w_t = X_t'\beta + u_t'\gamma \tag{8}$$

where u_t is now a vector with the three elements described by (3), (4) and (7). Conditional on the "right" unemployment rate, other measures of unemployment do not predict wages, and a test of the three alternative hypotheses resulting from the above theoretical models is equivalent to a test on the coefficients on the different measures of unemployment. If only one element of γ is significant, then we can exclude the other models. However, as we will find, results are more equivocal.

3 Institutional background

Our aim in this paper is to characterize the contract structure of wages, and in this respect, labor institutions matter. The particular importance of trade unions in the German model has often been pointed out. This section describes some pertinent aspects of German labor market institutions[3].

The German economy is characterized by a high degree of coverage by collective agreements. Although union membership is around 40 percent[4], union coverage by either industry-wide or firm-level contracts lies at around 90 percent of the eligible population[5]. Most contracts are

[3]For a good introduction see f.i. Flanagan, Soskice & Ulman (1983), for some recent developments in collective bargaining Thelen (1991).

[4]Author's tabulation from years in which this question was asked for in the GSOEP. See also Carruth & Schnabel (1993).

[5]Bundesministerium für Arbeit und Sozialordnung (1994). Industries with little coverage are predominantly in the services sector. Only workers contributing to the social insurance system are covered by collective agreements.

negotiated at the level of a regional industry. Thus, collective agreements on wages and earnings are defined for 1 200 region-industry cells in Western Germany and 250 in Eastern Germany (Bundesministerium für Arbeit und Sozialordnung 1994). The number of firms having individual contracts with unions outside of the industry-wide agreement has been slightly increasing in recent years, but it is unclear if the number of workers covered by these contracts has increased.

Regional and cross-industry differences exist, but there is informal coordination by the German Federation of Unions (*Deutscher Gewerkschaftsbund, DGB*). Informal evidence for spill-over effects is widespread. Furthermore, the Minister of Labor can legally extend contracts to the whole industry under certain circumstances. Thus, in 1994, the wage and earnings contracts were actually extended in 75 of the above region-industry cells (Bundesministerium für Arbeit und Sozialordnung 1994, pg. 32)[6]. It has been shown that when firms face a high enough probability of extension, they will act as if they were actually covered by the collective bargaining agreement (Margolis 1992). For these reasons, our data does not distinguish whether or not workers are covered by collective bargaining agreements. Some variation nevertheless exists, and for many firms, the industry-wide agreement only acts as a wage floor (Bellmann 1995), allowing us to perform a more detailed analysis in Section 6.

The duration of collective agreements on wages and earnings is usually one year. However, in 1988 and 1989, a significant part of the collective agreements signed had minimum durations of up to three years. This was apparently a one-time phenomenon linked to the ongoing negotiations over hours reductions, and most of the three-year contracts expiring were followed by the usual one-year contracts.

A feature that Germany shares with other European economies is the severely restricted use of fixed-length contracts. Over most of the sample period, German law restricted fixed-length contracts to 6 months. Though the law allows for renewal, utilization seems to be quite low[7]. Only about 4.5 percent of workers declaring themselves as working full-time are on fixed length contracts, compared to 6.9 percent of part-time workers. Women are slightly more likely to be on fixed length contracts then men (7.2 and 4.5 percent respectively).

Finally, the relevant compensation variable we consider are earn-

[6] These extensions occur predominantly in retail trade and in the cleaning industry.

[7] The degree of utilization in our sample is actually decreasing over the sample period, though this may be a result of the non-random sampling nature of the GSOEP. Hunt (1995) describes the changes and estimates the effect on employment. For the role of fixed-length contracts in France, see Abowd, Corbel & Kramarz (1996).

ings. Contrary to North America, where blue-collar workers tend to receive hourly compensation, German blue-collar workers tend to be compensated similar to white-collar workers, on a monthly or bi-weekly basis. Thus, 11 percent of workers (in Western Germany) are covered by contracts which do not differentiate between blue and white collar workers, and in which both categories are paid a monthly salary invariant in hours. For a further 40 percent of blue collar workers, the collective agreement, though separate from that for white collar workers, specifies a fixed monthly salary (Bundesministerium für Arbeit und Sozialordnung 1994).

4 Data and estimation

The data used comes from the German Socio-Economic Panel (GSOEP). We will briefly describe some aspects this dataset that are of importance to the present study. Wagner, Burkhauser & Behringer (1993) and Burkhauser (1991) provide a more detailed description of the public use file available outside Germany.

The GSOEP is a longitudinal panel data set first created in 1984. Respondents are reinterviewed each year. Response rates are quite high. Children are followed separately once they leave the original household, providing for some non-random compensation for panel attrition.

The questions asked are not restricted to economic questions, ranging from social to political subjects. Through the structure has varied from year to year, a great deal of homogeneity has been preserved, facilitating comparison over the years. A new, East German panel was started after German unification in 1990.

The survey instrument for the GSOEP was modeled after the PSID, and tries to avoid some of the problems the latter dataset had. Thus, the question on job tenure is fairly unambiguous[8], asking respondents the month and year they started working for their current employer[9]. Some problems nevertheless occur. For example, in some waves, a number of questions relating to the job market and the current job were only asked of job changers. If this occurs, or data is missing, we carry forward information obtained in the previous wave conditional on the worker reporting no change in his job situation w.r.t. the previous year.

[8] See Altonji & Shakotko (1987) and Topel (1991) for a treatment of the problems with the tenure data in the PSID.

[9] This author has worked with both the English translation and the original German questionnaires, and has found that in some waves, the English translation of the tenure question renders ambiguous what is not in German. More information is available from the author upon demand

Furthermore, if an individual reports conflicting data on the year she started working with the present employer, we use and carry forth the earliest report of a date. In this manner, we force tenure to be consistent across year.

Throughout, we present results are reported for net and gross real earnings. We would expect net earnings to be the variable of interest to workers, and thus the pertinent variable in union bargaining, though gross earnings are closer to the true cost of labor to the employer, and thus more appropriate in models imposing a zero profit condition. Hence, it is not clear which to use, and we avoid having to choose by using both variables.

We restrict our sample to blue and white collar workers with contracts of indeterminate length who are working full-time, are German nationals and are living in Western Germany. We exclude workers with fixed length contracts at this stage due to ambiguity inherent to such contracts in the context of the theoretical models[10]. Due to the unavailability of data on contract duration in 1984, our sample is restricted to the years 1985 to 1994. Excluding workers in agriculture and in the public sector as well as civil servants scattered in other industries leaves us with 10 551 observations on 2 182 individuals[11]. Finally, we eliminate individuals who have only one observation in the sample, since we need at least two observations to be able to eliminate individual-specific effects. Table 1 gives a summary of the reductions made. Summary statistics are given in Table 2.

The unemployment data in this paper is the quarterly (after 1985) and yearly (before 1985) aggregate unemployment rate from BLS files and thus may not correspond exactly to German data[12]. An eyeball

[10]Separation for these contracts is exogenous, except if the contract is transformed into one of indeterminate length. It is unclear whether renegotiation will occur during the short duration of the contract. Furthermore, our data does not allow us to determine whether a fixed length contract in two consecutive years is with the same employer, and the tenure question may be ambiguous in these cases. Most previous studies seem to not have excluded these workers. Results obtained here when including them are not drastically different.

[11]About half of the eliminations for missing variables are due to missing initial experience.

[12]The BLS vaguely states that "When there are substantial conceptual differences, the Bureau adjusts the data to improve comparability or describes the differences so users will not draw misleading conclusions. In adjusting data for greater comparability, BLS must depend on the availability of relevant information, and in some instances it is necessary to make estimates based on incomplete data. Therefore it is possible to achieve only approximate statistical comparability among countries. [...] Labor force, employment, unemployment and related measures are adjusted where necessary to approximate U.S. definitions and standards."(Bureau of Labor Statistics 1996)

	Observations	Persons
Full GSOEP dataset used	107 252	18 185
Employed	72 396	14 591
Germans living in W Germany	44 700	7 754
Only FT working persons	33 927	6 165
Missing data	17 594	3 233
Excluding agriculture, public sector	12 760	2 603
Restricting to white/blue collar	11 176	2 320
Only unlimited contracts	10 551	2 182
of which:		
Men	8 422	1 489
Women	3 378	822

Table 1: Sample reduction

comparison with graphs of German unemployment published elsewhere (Steiner 1994) confirms that relative levels in the unemployment rate are not affected by the BLS corrections. Data on the consumer price index used to deflate earnings is also drawn from BLS files.

Contemporaneous unemployment rates are merged into the GSOEP using the month preceding the interview month, for which earnings are reported. Initial unemployment rate is taken from the quarter the current job is reported to have started if available. Otherwise, the average unemployment rate over the year in which the job started is used. Minimum unemployment is computed by searching between the starting date of the employment relation and the current date.

A more complete description of the data treatment is given in a separate appendix.

5 Results

The main results of this paper are reported in Table 3. To estimate Equation (8), we have controlled for experience and tenure up to squared terms, education as measured in years, dummies for industry, marital status[13], a linear trend, and, if the regression is in levels, for sex[14]. Errors

[13]We use an indicator for the status of being single. Other dummy variables led to comparable results.

[14]Other specifications were tested, especially up to cubic terms in experience and tenure. Embedded F-tests cannot reject a quadratic against the null of a cubic specification at the 5 percent level, but can reject a linear against a cubic specification.

Variable	Full sample		Men		Women	
Mininum unemployment rate over tenure	2.87	(2.05)	2.74	(2.07)	3.21	(1.97)
Maximum unemployment rate over tenure	7.00	(0.48)	7.01	(0.47)	6.96	(0.52)
Unemployment rate at start of tenure	3.37	(2.33)	3.24	(2.36)	3.69	(2.22)
Unemployment rate at time of interview	5.91	(0.92)	5.89	(0.92)	5.95	(0.91)
Month of interview	3.26	(1.03)	3.23	(1.01)	3.33	(1.07)
Contractual hours	39.17	(2.64)	39.32	(2.66)	38.80	(2.53)
Actual weekly hours	42.60	(7.97)	43.45	(8.33)	40.37	(6.44)
Desired hours per week	37.52	(6.92)	38.92	(6.19)	33.89	(7.39)
Net Income in 1994 DM	2990.81	(1305.74)	3301.68	(1345.10)	2184.90	(731.25)
Gross Income in 1994 DM	4476.94	(1971.29)	4867.43	(2062.35)	3455.40	(1217.93)
Years of education	11.33	(2.06)	11.39	(2.11)	11.17	(1.91)
Age at first job	18.24	(3.09)	18.47	(3.25)	18.09	(2.88)
Age	40.55	(10.50)	41.29	(10.10)	38.65	(11.25)
Single dummy (1/0)	0.27	(0.44)	0.20	(0.40)	0.47	(0.49)
Married, living together (1/0)	0.70	(0.45)	0.78	(0.40)	0.49	(0.50)
On-the-job Tenure	12.16	(8.24)	12.83	(8.41)	10.41	(7.50)
Initial experience	10.40	(8.64)	10.37	(9.73)	10.48	(10.34)
Female	0.27	(0.44)				
Number of obs.	10551		7614		2937	

Standard deviations in parenthesis.

Table 2: Means

reported here are not corrected for heteroskedasticity, but results using the White (1980)-correction yielded very similar results. Fixed effects were flushed out by using deviations from individual specific means.

Rows 1 to 3 show results obtained when including only measures of past labor market tightness. When including both the lowest unemployment rate since the start of the job and the unemployment at the start of the job, it seems that each coefficient is capturing part of the effect, as the sum is approximately equal to the coefficient when each is estimated separately. In Rows 4 to 7, the current unemployment is included in various combinations with the two previous measures. The estimated coefficient on current unemployment is stable across all specifications, and precisely estimated, suggesting that it is orthogonal to the other two measures. However, as Row 7 shows, once we have controlled for the initial and the current state of the labor market, the lowest unemployment rate seems to have no effect any more.

Row 8 reports results obtained when ignoring the panel aspect of the data. Restricting individual fixed effects to be zero seems to significantly bias the estimates on initial unemployment. This is confirmed by a formal F-test[15]Since the person fixed-effect can be interpreted as individual differences in productivity, the positive bias is consistent with some selection occurring in tight labor markets. Intuitively, when labor markets are tighter, matches are better since employers can filter workers from a longer queue. On average, workers starting a job under these circumstances would be of higher quality.

On the other hand, both the effect of the lowest unemployment conditions and the effect of contemporaneous unemployment are unaffected by fixed effects.

Row 7 thus captures the main result of this paper. The strongest effect on current earnings is through current unemployment. However, previous conditions in the labor market are also significantly correlated with current earnings, although their effect is only about half that of contemporaneous labor conditions. The elasticities corresponding to the point estimates in Row 7 are about 10 percent for contemporaneous unemployment and about 4 percent for initial unemployment. Neither a model that correlates only the contemporaneous unemployment rate with earnings, such as the simpler efficiency wage models as well as rent-sharing and spot market models, nor the implicit contract models are

However, the linear specification cannot be rejected against the null of a quadratic specification at 1 percent level. It is thus not clear, based upon these tests, which specification to choose.

[15]We can still consistently estimate the effect of initial unemployment because we consider the person fixed-effect, whereas the initial unemployment rate is job-specific.

NET EARNINGS

		(a)	(b)	(c)
	Means	3.37	5.91	2.87
(1)	Fixed Effects	-0.0113	–.–	–.–
		(0.0036)		
(2)	Fixed Effects	–.–	–.–	-0.0125
				(0.0031)
(3)	Fixed Effects	-0.0042	–.–	-0.0097
		(0.0045)		(0.0031)
(4)	Fixed Effects	–.–	-0.0195	–.–
			(0.0019)	
(5)	Fixed Effects	-0.0133	-0.0200	–.–
		(0.0032)	(0.0019)	
(6)	Fixed Effects	–.–	-0.0190	-0.0102
			(0.0020)	(0.0031)
(7)	Fixed Effects	-0.0114	-0.0198	-0.0026
		(0.0045)	(0.0020)	(0.0044)
(8)	Pooled sample	-0.0039	-0.0218	-0.0025
		(0.0045)	(0.0042)	(0.0062)
(BD)	Fixed effects	-0.006	-0.007	-0.029
		(0.007)	(0.0025)	(0.008)

Coefficients on (a) Unemployment at start of tenure (b) Contemporaneous unemployment rate (c) Minimum rate over tenure. Significance at ** 1% level, * 5% level and + at 10% level. Standard errors in parentheses. All regressions include experience and tenure up to squared terms, education in years, hours in logs, dummies for industry, marital status (single), a time trend and if in levels, for sex. Row (BD) is taken from Table 2, row 10 in Beaudry & DiNardo (1991).

Table 3: Main results

sufficient to explain the dynamics of earnings.

However, the fact that there is a strong correlation between initial and lowest unemployment in our sample may cast some doubt on the result that it necessarily be the initial unemployment rate that influences unemployment[16]. The average time elapsed between start of the job and occurrence of the lowest unemployment rate in the sample is 15 months (27 months conditional on being strictly positive), and for only 40 percent of the observations, this value is larger than 12 months. Thus, it is possible that we cannot distinguish the two effects. Further analysis will be necessary to clarify this point.

Table 4 reports equivalent results using gross instead of net earnings as dependent variable. Note that in general, point estimates of the effect of contemporaneous unemployment are lower, point estimates of the initial conditions are higher, whereas estimates of the effect of the lowest unemployment rate remain unchanged. Most important fact here is that it can no longer be rejected that the effect of initial and of contemporaneous unemployment are of equal size. Since gross pay is before payroll and withholding taxes paid by the employee, it is net of employer-paid payroll taxes. Thus, this may be an indicator of a certain redistribution effect of the progressive German income tax schedule.

Turning our attention to Table 5, we disaggregate results according to sex. Our sample is disproportionately composed of men, furnishing 73 percent of sample observations and 65 percent of the sample population. Tenure for men is longer, and the distribution across industries is different. Furthermore, since the participation decision is not modeled here, it is a standard result that coefficients may be biased[17]. Part of the results in Tables 3 and 4 seems to be driven by the female part of the sample. In particular, female earnings are strongly correlated with the initial unemployment rate, whereas male earnings are more strongly correlated with minimum unemployment. Since we do not model the participation decision, the coefficients obtained for the female model remain tentative at best. In what follows, we thus concentrate on the male subsample.

Note that estimates in Table 5 for the effect of previous labor market

[16] The correlation of minimum unemployment with initial unemployment is 0.85, though the hypothesis that they are equal can be rejected, whereas the correlation between current unemployment and minimum unemployment is not significant.

[17] Heckman (1976), Mroz (1987). Groot, Mekkelholt & Osterbeek (1992) show in the case of the Netherlands that estimates of the effect of contemporaneous unemployment for women may be severely biased if no self-selection correction is done, and that current unemployment affects not only the wage but also the participation decision. See also Strøm & Wagenhals (1991) on female labor supply in Germany.

Gross Earnings

		(a)	(b)	(c)
	Means	3.37	5.91	2.87
(1)	Fixed Effects	-0.0155	–.–	–.–
		(0.0032)		
(2)	Fixed Effects	–.–	–.–	-0.0159
				(0.0030)
(3)	Fixed Effects	-0.0075	–.–	-0.0109
		(0.0044)		(0.0042)
(4)	Fixed Effects	–.–	-0.0137	–.–
			(0.0019)	
(5)	Fixed Effects	-0.0169	-0.0142	–.–
		(0.0032)	(0.0019)	
(6)	Fixed Effects	–.–	-0.0130	-0.0143
			(0.0019)	(0.0030)
(7)	Fixed Effects	-0.0126	-0.0138	-0.0058
		(0.0045)	(0.0019)	(0.0043)
(8)	Pooled sample	-0.0031	-0.0135	-0.0058
		(0.0045)	(0.0042)	(0.0063)

Coefficients on (a) Unemployment at start of tenure (b) Contemporaneous unemployment rate (c) Minimum rate over tenure. Significance at ** 1% level, * 5% level and + at 10% level. Standard errors in parentheses. All regressions include experience and tenure up to squared terms, education in years, hours in logs, dummies for industry, marital status (single), a time trend and if in levels, for sex.

Table 4: Main results

	Net earnings		Gross earnings	
	(a)	(b)	(c)	(d)
Unemployment:	Men	Women	Men	Women
First	-0.0050	-0.0257**	-0.0052	-0.0275**
	(0.0053)	(0.0091)	(0.0052)	(0.0093)
Current	-0.0214**	-0.0183**	-0.0162**	-0.0082*
	(0.0024)	(0.0036)	(0.0023)	(0.0034)
Minimum	-0.0085+	0.0105	-0.0126*	0.0160*
	(0.0052)	(0.0079)	(0.0051)	(0.0074)

Significance at ** 1% level, * 5% level and + at 10% level. Standard errors in parentheses. All regressions include experience and tenure up to squared terms, education in years, hours in logs, dummies for industry, marital status (single) and a time trend.

Table 5: Results by sex of respondents

conditions are again fairly imprecise, possibly due to collinearity between the two variables. Table 6 shows that either one of these variables will capture the full effect more or less precisely if the other variable is omitted. At this point, we can only state safely that past labor market performance matters - it is uncertain which of the variants of the implicit contracts model better explains the data.

Row (BD) at the bottom of Table 3 reports the results obtained by (Beaudry & DiNardo 1991) for the United States. In PSID data, the effect of minimum unemployment rate clearly dominates the effect of contemporaneous and of initial unemployment rate, the latter not being significantly different from zero. The German case is more nuanced, lending support to a mixture or simultaneous presence of two mechanisms. The first affects current earnings through the current state of the labor market. A number of models can be consistent with this result, as we have expounded in Section 2. However, the institutional background outlined in Section 3 would lend credence to a rejection of a simple spot market model in favor of a model of rent-sharing. The negative effect of unemployment can then be interpreted as evidence of risk-averse unions bargaining over both employment and wages, if bargaining powers are heterogeneous across industries. The resulting bargaining outcome then feeds imperfectly into individual contracts, still allowing for aspects of implicit contracts to have effect.

It may be seen as corroborating evidence that unions have in recent

	Net earnings			Gross earnings		
	(a)	(b)	(c)	(d)	(e)	(f)
(1)	-0.0050	–.–	-0.0111**	-0.0052	–.–	-0.0144**
	(0.0053)		(0.0038)	(0.0052)		(0.0037)
(2)	-0.0214**	-0.0211**	-0.0220**	-0.0162**	-0.0159**	-0.0171**
	(0.0024)	(0.0023)	(0.0023)	(0.0022)	(0.0023)	(0.0023)
(3)	-0.0085+	-0.0119**	–.–	-0.0126+	-0.0162**	–.–
	(0.0052)	(0.0037)		(0.0050)	(0.0036)	

Coefficients on (1) Initial unemployment (2) Current unemployment (3) minimum unemployment. Significance at ** 1% level, * 5% level and + at 10% level. Standard errors in parentheses. All regressions include experience and tenure up to squared terms, education in years, hours in logs, dummies for industry, marital status (single) and a time trend. All variables in deviation from individual means.

Table 6: Results for male workers

years put a stronger emphasis on reduction of hours in order to maintain or increase employment. Our results are consistent with this

In the next section we study the robustness of the above results across several dimensions of the dataset before drawing a final conclusion.

6 Robustness of results

In this section, we take the sample of male workers and further separate it into subsamples. Since labor markets may function differently for individuals characterized by the size of the firm or the industry they work in, or by particular characteristics of their labor market history, not only may this characteristic influence his level of earnings, but may in fact alter the compensation structure.

6.1 Firm size

A number of models have shown that the labor market may be segmented into tiers of jobs that function as a ladder (e.g. Jovanovic & Nyarko (1996)). Conceivably, these jobs are associated with increasing firm size. On the other hand, these jobs may be within one large firm, and constitute an internal hierarchy of jobs. Furthermore, some studies have shown that firm size affects earnings and wages not only through worker quality - which we capture with fixed effects - but through firm-worker matches (Abowd, Kramarz & Margolis 1994). If firms are homogeneous

FIRMSIZE	Freq	Mean tenure	Mean initial exp
under 5	983	9.77	9.88
		(7.89)	(10.52)
5 to 20	1860	10.90	11.61
		(7.16)	(10.57)
20 to 200	2004	12.43	11.58
		(7.78)	(9.75)
200 to 2000	2243	13.92	9.08
		(8.04)	(9.05)
2000 and more	675	15.34	8.11
		(8.20)	(8.45)

Standard errors in parentheses.

Table 7: Tenure and initial experience by firmsize

within size categories, this will again be reflected in differences in the remuneration structure.

It could be argued that firm size is a bad instrument for job ladders, as collective bargaining agreements cover all companies within an industry, irrespective of their size (see Section 3). However, variations do exist, and as we will see, are important.

Results are reported in Table 8[18]. A dichotomy appears between very large firms (more than two thousand employees) and smaller ones. Whereas contemporaneous labor market tightness has no significant effect on wages in the former, smaller firms are remarkably homogeneous as to the effect of contemporaneous unemployment. Measures of previous labor market tightness give confused signals, being sometimes estimated with a positive coefficient, and of varying precision. Again, this may be due to the strong correlation in our data of initial and lowest unemployment rate. This effect does not disappear when constraining one or the other of these coefficients to be zero. No discernible pattern appears. When only differentiating two types of firms: very large firms and others, the null that both initial and minimum unemployment have no effect on earnings for workers at smaller firms cannot be rejected. This is no surprise, given the volatile nature of these coefficients in the subsamples reported in Table 8[19].

[18] Firm size is reported in five categories. Table 7 reports frequencies.

[19] When allowing for variation only through firm size dummies, the coefficients on these latter indicate lower earnings at intermediate sized firms, but approximately equal for tiny firms. Though each one is not significant, the hypothesis that firm size

	< 5	5 to 20	20 to 200	200 to 2000	>2000
Initial	-0.0553**	0.0119	0.0607**	-0.0070	0.8700
	(0.0164)	(0.0208)	(0.0141)	(0.0142)	(0.5880)
Current	-0.0347**	-0.0259**	-0.0271**	-0.0263**	0.0069
	(0.0082)	(0.0073)	(0.0045)	(0.0041)	(0.0085)
Minimum	0.0487**	-0.0139	-0.0671**	0.0071	0.4225*
	(0.0133)	(0.0169)	(0.0156)	(0.0153)	(0.1829)

Significance at ** 1% level, * 5% level and + at 10% level. Standard errors in parentheses. All regressions include experience and tenure up to squared terms, education in years, hours in logs, dummies for industry, marital status (single), and a time trend.

Table 8: Results by firm size

It is worth noting that the return to initial experience is stronger relative to firm-specific experience for tiny firms. This fits well with the fact that firms with less than 10 employees are not subject to the fairly stringent German layoff regulations[20], allowing them to participate more actively in search activities. Workers' tenure at these also is lower than elsewhere, also suggesting that job security is less than perfect.

At the other extreme, and markedly different from the intermediate categories, lie the very large companies. Initial experience finds no remuneration, whereas firm-specific experience is more highly remunerated. Again, one might find this consistent with the view that large firms have a more strongly hierarchical structure, and provide for stable internal career paths. This finds support in the observation that average tenure is increasing and initial experience decreasing in firm size (see Table 7).

6.2 Blue vs. white collar

As pointed out earlier, blue-collar pay in Germany is much more similar to white-collar remuneration than in North America. However, since we cannot distinguish between hourly pay and monthly remuneration, the distinction according to status serves as a proxy. Alternatively, the method of remuneration may not be the only aspect affecting remuneration dynamics.

Accepting status as a proxy for remuneration methods, it is still not clear whether blue-collar pay should vary more or less with labor-market

dummies are jointly zero is rejected.

[20]See f.i. Hunt (1995) on the effects of layoff costs on employment in Germany.

	Net earnings			Net wage		
	Blue	White collar		Blue	White collar	
	(a)	(b)	(c)	(d)	(e)	(f)
(1)	-0.0004	-0.0038	–.–	-0.0040	-0.0067	–.–
	(0.0085)	(0.0076)		(0.0111)	(0.0108)	
(2)	-0.0261**	-0.0183**	-0.0181**	-0.0248**	-0.0187**	-0.0184
	(0.0037)	(0.0032)	(0.0031)	(0.0049)	(0.0046)	(-0.0045)
(3)	-0.0081	-0.0096	-0.0122*	0.0062	-0.0147	-0.0194
	(0.0076)	(0.0075)	(0.0052)	(0.0101)	(0.0106)	(-0.0075)

Coefficients on (1) Initial unemployment (2) Current unemployment (3) minimum unemployment. Significance at ** 1% level, * 5% level and + at 10% level. Standard errors in parentheses. All regressions include experience and tenure up to squared terms, education in years, hours in logs, dummies for industry, marital status (single), and a time trend.

Table 9: Results by worker class

conditions. In an implicit contract model, earnings are consumption, and should, if perfectly insured, not vary with contemporaneous unemployment. However, if firms can adjust hours as well as pay, then wage rates may well change. The labor market institutions outlined in Section 3 seem to imply that for most white-collar workers, remuneration does not vary with hours, and this applies to a significant portion of blue-collar workers as well. However, given the extant discrepancies, we would expect more variance in blue-collar wage rates, rather than earnings, when compared to white-collar wage rates.

Table 9 reports results on separate regressions for blue and white-collar. The results are similar to those previously obtained for the pooled male sample. Again the contemporaneous unemployment rate is the dominant effect, though weaker for white collar workers than for blue collar workers. On the other hand, eliminating initial unemployment reinforces the coefficient on minimum unemployment for white-collar workers, but not for blue-collar workers. No significant difference appears when using wage rates instead of earnings, as Columns (d) to (f) of Table 9 show[21].

Rather than looking at two different variants of the same implicit contract model, the results in Table 9 suggest something stronger. Although

[21] The respective coefficients (standard errors) from a regression on net hourly wages on the pooled sample are -0.0135 (0.0062) for initial unemployment, -0.0198 (0.0027) for contemporaneous unemployment, and 0.0019 (0.0060) for minimum unemployment.

a large number of blue- and white-collar workers share similar collective bargaining agreements, individual-level contracts differ in their dynamics. Specifically, implicit contracts seem to play a role for white-collar workers, but not for their blue-collar colleagues.

6.3 Industry specific regressions

Table 10 reports results when running regressions industry by industry[22] . Given that collective bargaining in Germany generally takes place on the industry level, usually between industry-specific unions and employer association, it is not unreasonable to think that different industries might present different contract structures. The results indicate strong support for the previous results, although a caveat applies. The fit of most human capital variables is not very good, though it should be pointed out that no control was made for the industry specificity of experience, and whether occupational changes occurred during the current tenure with the firm, and this might well bias the estimates of the return to experience and to tenure[23].

It turns out that as before both contemporaneous as prior unemployment affect current earnings. The effect of prior unemployment, either minimum or initial unemployment, is in general stronger than in the pooled sample, the point estimate of its elasticity being approximately equal to the elasticity of earnings with respect to contemporaneous unemployment. However, some industries show little effect of labor market conditions (Textile/food, trade, financial services). This may be due to heterogeneity within the aggregate industries used. For instance, financial services groups (white-collar) workers from the banking sector, who mainly work at bank counters and within bank branches, with insurance agents working on incentive contracts and in the field. We would expect very different results for each one of those groups, though at this stage we cannot distinguish them. Further analysis is required to disentangle the different effects. The main result to retain is that if labor market conditions affect earnings, they do so through both past and current unemployment, much as in the other subsamples analyzed before.

[22]The industry classification we use is more aggregated than the one available in the GSOEP (35 industries are distinguished there). In order to keep a sufficiently large sample size, we have aggregated for the purpose of the regressions in this section into larger categories. Regressions only include individuals with at least 2 observations in an industry.

[23]See on this subject Parent (1995), Neal (1995)

	Natural resources	Chemicals Synthetics	Iron/ Steel	Mechanical engineering	Electrical engineering
Initial Experience	0.005	-0.025	0.009	0.037**	0.042**
	(0.012)	(0.048)	(0.017)	(0.009)	(0.010)
Experience squared	0.017	0.246	-0.058**	-0.127**	-0.045+
(x 100)	(0.017)	(0.319)	(0.030)	(0.017)	(0.025)
Seniority	-0.001	0.013	-0.013	0.021**	0.030**
	(0.011)	(0.008)	(0.013)	(0.007)	(0.009)
Seniority squared	0.009	-0.023+	-0.048**	-0.062**	0.002
(x 100)	(0.017)	(0.012)	(0.013)	(0.010)	(0.016)
Education in years	-0.010	-0.005	0.032	0.018	-0.014
	(0.033)	(0.020)	(0.026)	(0.012)	(0.017)
Log monthly hours	0.001	0.004	0.043**	0.042**	0.152**
	(0.013)	(0.014)	(0.015)	(0.015)	(0.027)
Single	-0.139**	-0.068**	-0.059*	-0.152**	-0.050+
	(0.027)	(0.023)	(0.028)	(0.021)	(0.027)
Initial unemployment	-0.032	-0.025	-0.064**	0.010	0.042*
	(0.024)	(0.074)	(0.022)	(0.023)	(0.019)
Current unemployment	-0.019**	-0.025**	-0.027**	-0.035**	-0.011
	(0.006)	(0.005)	(0.006)	(0.005)	(0.007)
Minimum unemployment	-0.028*	0.032*	-0.005	0.030*	-0.056**
	(0.013)	(0.014)	(0.015)	(0.012)	(0.018)

(continued)

Significance at ** 1% level, * 5% level and + at 10% level. Standard errors in parentheses. Dependent variable is log net earnings. All regressions include a time trend.

Table 10: Results by industry

	Textile/ food	Construction	Trade	Financial services	Services
Initial Experience	0.030^{+}	0.029^{+}	0.010	0.046*	-0.010
	(0.016)	(0.014)	(0.010)	(0.019)	(0.014)
Experience squared	-0.072**	-0.027	-0.056**	-0.124^{+}	0.109*
(x 100)	(0.024)	(0.018)	(0.011)	(0.071)	(0.051)
Seniority	0.017	0.018	-0.006	0.012	0.012
	(0.014)	(0.015)	(0.010)	(0.011)	(0.011)
Seniority squared	-0.069**	-0.047**	-0.009	-0.048**	-0.011
(x 100)	(0.023)	(0.018)	(0.020)	(0.021)	(0.023)
Education in years	0.439*	-0.027	0.009	0.086**	-0.005
	(0.173)	(0.043)	(0.021)	(0.025)	(0.016)
Log monthly hours	0.014	0.013	-0.002	-0.050	0.003
	(0.027)	(0.019)	(0.028)	(0.037)	(0.019)
Single	-0.019	0.061	-0.007	0.020	-0.055
	(0.054)	(0.045)	(0.027)	(0.042)	(0.072)
Initial unemployment	0.031	-0.046^{+}	0.010	0.019	0.030^{+}
	(0.030)	(0.023)	(0.018)	(0.033)	(0.017)
Current unemployment	0.006	-0.032**	-0.006	0.013	-0.019**
	(0.012)	(0.009)	(0.006)	(0.009)	(0.007)
Minimum unemployment	-0.016	0.044*	-0.007	-0.009	-0.026
	(0.025)	(0.022)	(0.018)	(0.026)	(0.020)

Significance at ** 1% level, * 5% level and $^{+}$ at 10% level. Standard errors in parentheses. Dependent variable is log net earnings. All regressions include a time trend.

Table 10 (cont.): Results by industry

7 Other estimation procedures

The estimation was also run with a flexible form for the inter-temporal effects. These will fully capture the effect of current unemployment for two reasons. First, a full 90 percent of all interviews refer to earnings in the first quarter. This implies that the unemployment rates will almost exclusively come from three observations in the first quarter. Furthermore, the data on unemployment available to us is on a quarterly basis, and intermediate months are obtained by linear interpolation. The two quarterly observations before and after a data point are thus sufficient statistics to predict the intermediate values. The typical within-year variation in unemployment rates is therefore fairly low[24].

A plot of the estimated coefficients on year dummies closely follows an inverted graph of the unemployment, demonstrating a high correlation between these dummies and the underlying unemployment rate.

[plot about here]

Including a quadratic time trend instead of year dummies has much the same effect. It would be desirable to separately identify year effects common to all individuals and unemployment effects specific to contracts.

8 Concluding Remarks

The main result of this paper is twofold. First, we have shown that earnings dynamics in Germany are influenced by both previous and current labor market conditions. This contrasts with findings for the American labor market indicating the preponderance of previous labor market conditions, and it puts a caveat to the analysis in the wage curve literature, where wages are only correlated to current unemployment. No single model is able to entirely explain microeconomic movements of earnings in Germany.

We find that the elasticity of current earnings with respect to contemporaneous unemployment is on the order of 10 percent, comparable in strength to coefficients found in previous studies[25]. Furthermore, we find the elasticity of current earnings with respect to either minimum or initial unemployment to be about 4 percent in pooled samples and

[24] In a typical year, the within-year standard deviation of unemployment is 0.056 for a mean of 4.32 (data from 1992), and over 80 percent of all observations are concentrated on one value

[25] Blanchflower & Oswald (1994), Wagner (1994).

higher in several subsamples. Though data problems do not allow for a distinction between different mobility assumptions in implicit contract models, we do find that the state of the labor market as encountered by a white-collar individual during her tenure with her current employer affects her earnings even when controlling for today's unemployment rate. This is consistent with implicit contract models.

But, and this is the second result, a caveat applies. The above result is not universally valid in all parts of the labor market. A blue collar worker in a small firm will be much more affected by contemporaneous conditions than, say, a white collar worker in a large firm, controlling for other aspects of productivity. Whereas the former's earnings move in a way consistent with spot market models, the latter's earnings behave if anything according to an implicit contract model. Different labor markets seem to vary substantially as to the sensitivity of earnings to labor market conditions.

When comparing with previous results for the U.S. labor market, we find that the elasticity of earnings with respect to the best labor market conditions since the start of the current job is about 4 percent, about a third to half of the equivalent elasticity in the U.S. labor market (Beaudry & DiNardo 1991). Since the (short-run) elasticity of earnings with respect to contemporaneous labor market conditions is on the order of 12 percent at sample means and thus higher than the equivalent U.S. measure, it is fairly difficult to draw conclusions as to which labor market shows the "higher" flexibility. However, a tentative conclusion is that earnings in Germany seem to show no less flexibility with respect to labor market conditions than U.S. earnings.

Finally, though most of the above discussion is couched in the vocabulary of implicit contracts, it is important to point out that other models may well be consistent with the above findings. We have pointed out several in Section 2. Our findings as to the size of the firm seem to show that contracts in smaller firms are sensitive to market than those at very large firms. One possible interpretation is that small firms are too small to support internal labor markets, and thus substitute the marketplace for it. Large firms, on the other hand, offer a more stable environment in which internal labor market and hierarchical incentive systems may function. Support is also to be found in the observation that average tenure in our sample is higher for large firms, implying lower turnover.

Given the particular institutional structure of the German labor market, we hypothesize that some model superimposing collective bargaining agreements and individual contract models may be able to explain our results. We do not supply such a model, but establish stylized facts which such a model must be able to explain.

This paper is but a first result. Further research is needed in several directions. First, without here controlling for self-selection into the labor force, our results indicate that labor contracts may be of a different structure for women. If credence is to be given to the implicit contract model, then women are more likely to have higher mobility cost. It remains to be determined whether correction for self-selection will drastically change the results, as Groot et al. (1992) have shown for the Netherlands.

Second, while we have argued that a collective bargaining or rent-sharing model may be consistent with our findings, we do not test this, and further research should shed light on whether profit-related variables influence the wage outcome.

Several appendices with more detailed results are available from the author upon demand.

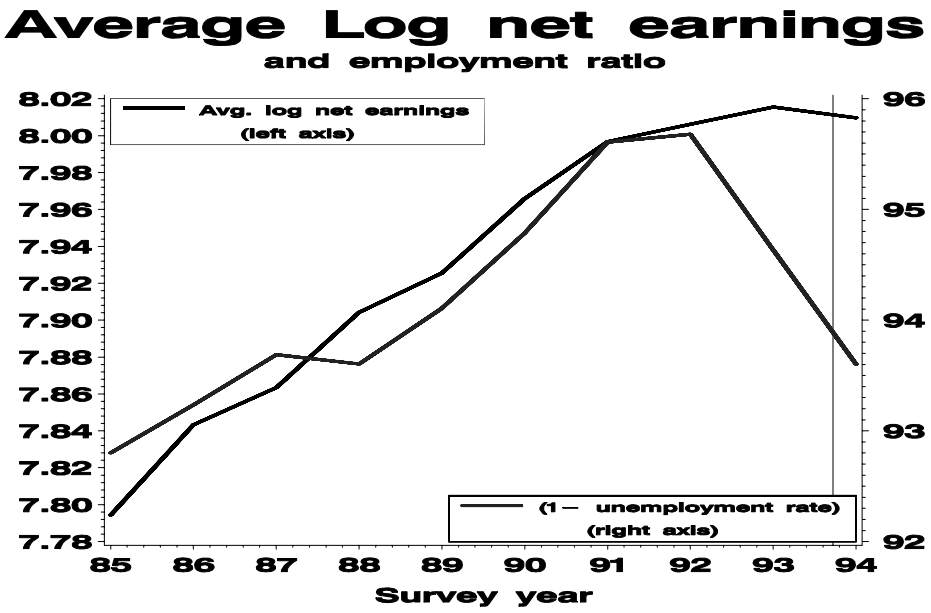

Figure 1: Comovement of inverse unemployment and earnings

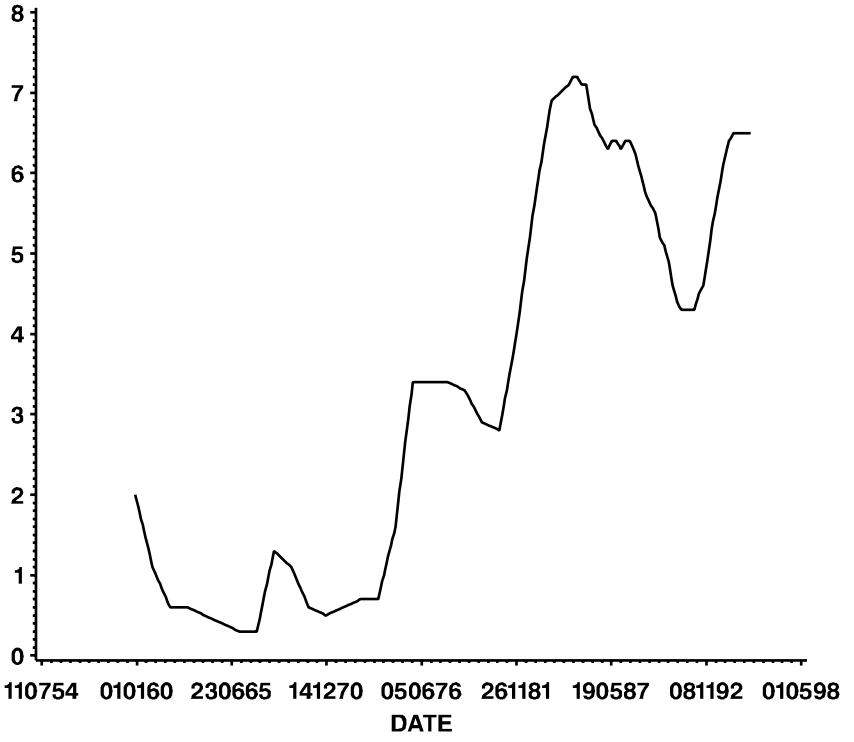

Figure 2: Plot of German unemployment rates

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